AP CALCULUS AB Name_____________________________Pd.___

Derivatives of Inverse Functions Supplement 2

1-4: Use the table below to find the derivative of each function at the given *x*-value.

x	–3	–2	–1	0	1	2	3
f (x)	4	3	2	0	–1	–3	–5
g(x)	0	1	2	1	0	–1	–2
f ′(x)	0	4	3	1	–3	5	2
g′(x)	2	1	–3	5	0	7	–2

1. $y = f^{-1}(x),\ x = -3$

2. $y = g^{-1}(x),\ x = -1$

3. $y = f^{-1}(g(x)),\ x = 2$

4. $y = g^{-1}(f^{-1}(x)),\ x = 3$

5-8: Find $(f^{-1})'(a)$ for the function *f* and value *a*.

5. $f(x) = 2x^5 + x^3 + 1,\ a = 4$

6. $f(x) = \sqrt{x-4},\ a = 2$

7. $f(x) = \dfrac{x}{x+1},\ a = 6$

8. $f(x) = \cos x$ for $0 \le x < \pi,\ a = 1$

Derivatives of Inverse Trig Functions Name______________________________Pd.___

$\frac{d}{dx}\sin^{-1}(AT) =$	$\frac{d}{dx}\tan^{-1}(AT) =$	$\frac{d}{dx}\sec^{-1}(AT) =$
$\frac{d}{dx}\cos^{-1}(AT) =$	$\frac{d}{dx}\cot^{-1}(AT) =$	$\frac{d}{dx}\csc^{-1}(AT) =$

Find the derivative of the following.

1. $y = \tan^{-1}(2x)$	2. $y = \sin^{-1}(x^2)$	3. $y = \sec^{-1}(x^3)$
4. $y = \arctan(x^2 + 1)$	5. $y = \arcsin(5x)$	6. $y = arc\sec(5x)$
7. $y = \arctan\left(\sqrt{x}\right)$	8. $y = \sin^{-1}\left(\sqrt{x}\right)$	9. $y = \tan^{-1}(x^2 + 2x)$
10. $y = \tan^{-1}(e^x)$	11. $y = x\tan^{-1}(x)$	12. $y = x^2\sin^{-1}(x)$
13. $y = e^x\sin^{-1}(x)$	14. $y = \ln(x)\arctan(x)$	15. $y = \sin^{-1}(e^x)$

Supplement 2 Front: Answers

1. $y'(-3) = 1/5$

2. $y'(-1) = 1/7$

3. $y'(2) = -7/3$

4. $y'(3) = -1/8$

5. $\left(f^{-1}\right)'(4) = 1/13$

6. $\left(f^{-1}\right)'(2) = 4$

7. $\left(f^{-1}\right)'(6) = 1/25$

8. $\left(f^{-1}\right)'(1)$ undefined

Back Answers: 1. $\dfrac{2}{1+4x^2}$ 2. $\dfrac{2x}{\sqrt{1-x^4}}$ 3. $\dfrac{3x^2}{x^3\sqrt{x^6-1}} = \dfrac{3}{x\sqrt{x^6-1}}$ 4. $\dfrac{2x}{1+\left(x^2+1\right)^2}$

5. $\dfrac{5}{\sqrt{1-25x^2}}$ 6. $\dfrac{5}{5x\sqrt{25x^2-1}} = \dfrac{1}{x\sqrt{25x^2-1}}$ 7. $\dfrac{\frac{1}{2}x^{-\frac{1}{2}}}{1+x} = \dfrac{1}{2\sqrt{x}\left(1+x\right)}$

8. $\dfrac{\frac{1}{2}x^{-\frac{1}{2}}}{\sqrt{1-x}} = \dfrac{1}{2\sqrt{x\left(1-x\right)}}$ 9. $\dfrac{2x+2}{1+\left(x^2+2x\right)^2}$ 10. $\dfrac{e^x}{1+e^{2x}}$ 11. $\dfrac{x}{1+x^2} + \tan^{-1}(x)$

12. $\dfrac{x^2}{\sqrt{1-x^2}} + 2x\sin^{-1}x$ 13. $\dfrac{e^x}{\sqrt{1-x^2}} + e^x\sin^{-1}x$ 14. $\dfrac{\ln\left(x\right)}{1+x^2} + \dfrac{\tan^{-1}(x)}{x}$